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Development of Visual Novel Games as Learning Media for the History of Indonesia's Independence

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ABSTRACT

Purpose of the study: This study aims to develop an Android-based visual novel game using material from the history of Indonesian independence and to determine the level of feasibility by going through a feasibility test on the Visual Novel Game application of the History of Indonesian Independence.

Methodology: This research is research and development type. Research and development is research with the aim of conducting research and innovating in making a product. System development in this study uses the Evolutionary Prototype method. With this method, the prototype can be continuously developed until the prototype fulfills the functions and procedures required by the system.

Main Findings: The results showed that the use of renpy as an engine facilitated the process of making the Visual Novel Independence Game application. Then, the independence game application is good and can be said to be appropriate as a learning medium. From the feasibility test summary, the feasibility percentage of the Visual Novel Merdeka game has an average of 76.6%. This percentage is categorized as having good eligibility. In terms of the material for the independence game application, it is also in accordance with the needs of teaching materials for grade 11 high school or vocational school.

Novelty/Originality of this study: This application is light, easy to understand and has a small size so that it will make it easier to use.

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1. INTRODUCTION

Learning is an obligation for every student and books are the most common learning resources used in student learning activities [1]–[3]. Students who open a textbook will find pages filled with rows of small writing, and sometimes accompanied by pictures or diagrams that are difficult to understand. All of that is arranged with a rigid layout in order to maximize the existing space. The bigger and thicker a book means more fine print and complex diagrams to deal with.

Learning history is part of education and history [4]. This has an important potential for the nation-building process, namely national education. Education is experiencing changes towards modernity, so it requires the preparation and development of the younger generation [5]–[7]. This will support the future,

especially the younger generation. Learning the History of Indonesian Independence is mostly done by using book media [8]. Learning media is something that is used to convey material or information that will be taught in learning activities so that the learning process is successful [9]–[11]. Learning media capable of conveying material or information about the history of Indonesian Independence so that the learning process is successful. [12]–[14].

The success of the learning process can be done by packaging the material to be studied in an interesting way [15]–[17]. Teachers must be able to package an interesting lesson so that their students are interested and motivated. This can encourage the development of technology and information (ICT), where learning can be more interesting by using multimedia [18]–[20]. Multimedia can take various forms, including presentation slides, films, animated videos, and games. In addition to the facilities must meet the standards, learning and learning outcomes must also be adjusted. Packaging of this material can be done through video games. Playing video games students will be faced with challenges after challenges that make students feel at home enjoying them for long.

The facilities are close to standard, each class is equipped with an LCD projector, has laboratories (computers and multimedia) with adequate facilities, but the learning system and student learning outcomes still need improvement. Based on observations on literature studies, learning is still not optimal, often learning only uses lectures and does not optimize learning aids. teaching practices that apply so far are often labeled as rote lessons. Students expect something more interesting and fun learning. This causes students not to focus and prefer to do their own activities.

Android applications are currently popular and are one of the most used application systems in the world today [21]–[23]. One genre of games that can be used as a learning medium is visual novels. A visual novel can be used as an alternative to learning from something, or a visual novel can generate interest in knowing a theme raised in history. Games with the visual novel genre should be developed, because these visual novels are mostly developed in Japan.

The phenomenon that exists when students run a video game software, will find good pictures and animations, complemented by music, sound effects and interesting visual effects. Based on the phenomenon above, most children would prefer to play video games rather than open textbooks. The main problem in learning that is commonly applied today is the less attractive way of delivery. This is one of the main reasons why students are reluctant to study, not because the material is too difficult to understand, but because learning and the learning media used are boring.

Games in the form of educational-based Visual Novels, students can take advantage of time for themselves by playing games that are beneficial in their learning. In the Visual Novel Game, students will be faced with a story that can be used as an example, so that they can change behavior. Students will be interested and deeper into the material. This can help apply the positive values contained in the game, characters with motivation to learn will grow in the soul. Ordinary learning becomes fun learning because learning activities occur while playing.

Identification of the problem based on the background above is known that most of the learning media for history is only in the form of books, students are less interested in reading thick and complicated history books, and there is a lack of alternative learning media for history subjects. so it is important to conduct this development research, for new innovations to be able to increase student knowledge and help students learn independently. This study aims to develop an Android-based visual novel game using material from the history of Indonesian independence and to determine the level of feasibility by going through a feasibility test on the Visual Novel Game application of the History of Indonesian Independence

2. RESEARCH METHOD

This research is a research and development type. Research and development is research with the aim of conducting research and innovating in making a product [24]–[26]. System development in this study uses the Evolutionary Prototype method. With this method, the prototype can be continuously developed until the prototype fulfills the functions and procedures required by the system. The main goal when using Evolutionary Prototype is to build a very robust prototype in a structured way and continually improve on it.

This research was conducted at the Teaching and Education Faculty of Sebelas Maret University in the Informatics and Computer Engineering Education Study Program. Collecting data in this study using interviews, questionnaires, and literature. Interviews were conducted for trial tests on application prototypes to assessors. This interview was conducted online via messaging and e-mail applications. The questionnaire is used to retrieve data from the due diligence. There are 3 types of questionnaires based on the desired target. Literature study is used to determine the concept of visual novels and learning materials. There are several journals, theses, and official websites that are used as the basis for making applications. Then, the research instrument used in this research is a questionnaire that will be given to media experts, material experts and users. The material expert instrument grid can be seen in the table below.

Table 1. Material expert instrument grid

No	Parameter
1	Conformity of material with competency standards
2	Accuracy of material with basic competence
3	Systematic presentation of material
4	Clarity of material description
5	Adequacy of training
6	Adequacy of providing feedback on motivation to learn
7	Material truth
8	The images presented support the material
9	Use of language that is easy to understand
10	Sufficient weight

Furthermore, media expert instruments were also used. The material expert instrument grid can be seen in the table below.

Table 2. Media expert instrument grid

No	Parameter
1	Font selection
2	Selection of font color and size
3	Consistency of button placement
4	Image display quality
5	Accompaniment music support
6	Screen display
7	sound clarity
8	Accurate use of language
9	Background color with text
10	Overall Game Rating

Then, the user instrument or usage test is also used. The usage test instrument grids can be seen in the table below.

Table 3. Grid of wear test instruments

No	Parameter
1	Is the game running well
2	Usability (Easy to use and simple to operate)
3	Completeness and quality of information materials
4	Does every button work properly
5	Ease to understand
6	Game character design
7	Audio (sound effects, background, music)
8	Visuals (layout design)
9	Background color with text

This research is a type of research and development so that the analysis will be in the form of descriptive narrative from quantitative data without making hypotheses. Quantitative descriptive data analysis will be divided into 2 stages. The first stage is data analysis from media experts and material experts to present the results of the development of the independence game application as a learning medium and show its feasibility. The second stage will present the results of the usage test to users to demonstrate the feasibility of the independence game application. The scale used in this study is a Likert scale whose weights are worth 1, 2, 3, 4, and 5 with attitude measurements from negative to positive.

3. RESULTS AND DISCUSSION

To facilitate evaluation, the requirements for visual novel game applications are divided into two types. The first type is functionality requirements. Functionality requirements are requirements that contain any processes that can later be carried out by the application system. The second type is non-functionality requirements. This requirement contains other requirements needed in the application development process.

The specifications listed on the hardware requirements already meet the minimum requirements for some of the software used in system development. Additional hardware in the form of a tablet is required for illustration creation. Smart phone hardware is used to evaluate the user on the application.

The design of this independence game uses a general visual novel design that does not add mini games to the system. This game will use a point system that will be accumulated in each chapter to determine the course of the story in the game. Each chapter contains different material and has its own requirements to advance to the next chapter.

The material will be taken from the Indonesian History textbook for class XI semester 2. The material will be taken from chapter 6 which contains the history of Indonesian independence. This book is a package book from the government so that the material content is qualified. This game uses self-made assets, tracing background images, and open source music. Image character created by using the Firealpaca program. Tracing background images are made using the Adobe Photoshop program. The story from the visual novel game will take material from the history textbook for class 11 pages 76-126. The material will be summarized and then made into a discussion in the story. The story of this VN Game will be divided into 1 opening chapter, 4 core chapters, and 2 final chapters.

Visual novel games will focus on stories that users will enjoy. In those stories the user will sometimes be given a choice for the next step in the story. This choice will affect the storyline. There are 2 types of options, namely the main option and the trap option. Trap options are choices that will appear on the sidelines of the story. If the user chooses the wrong trap option, the game will end. Main choices are choices that will affect the storyline until the opening of one of the endings.

Ren'py is a game engine that uses the Python programming language. When a new project is created we will be prepared with several scripts and directories from the Ren'py launcher. Inside there is a Python script file that is given to be set according to the design that has been prepared.

Evaluation of prototype products using the renpy emulator. The game application system runs on the Windows operating system. For functionality requirements, it can run well and game applications can be played up to the limit of chapter 2. After completing the evaluation using the emulator, the prototype product is built into apk form to be installed on an Android smartphone.

Applications that have been installed on Android smartphones will be evaluated by the user. In this evaluation the game application system when the game can run smoothly. Evaluate the functionality requirements have been met. However, a problem was found where the game application could not be closed using the back button of the Android smartphone. Because of that, an exit button was added to the main menu to close the game. The user is assisted by a quick button when running the game.

Inside the quick button there are too many buttons so that they are small and difficult to press from the smartphone monitor screen. Therefore, buttons with similar functions were removed. The buttons are quick save (Q.save) which is similar to menu save and Quick load (Q.load) which is similar to menu load. The name of the prefs button which functions to open the main menu button is replaced with the name of the menu button.

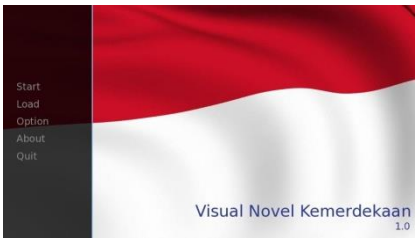
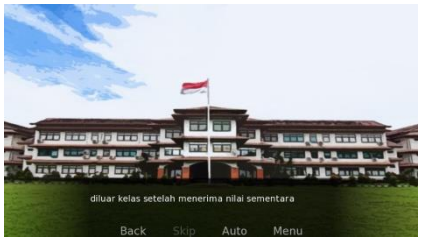
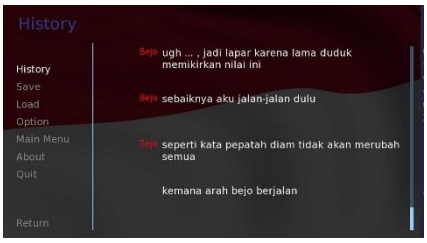
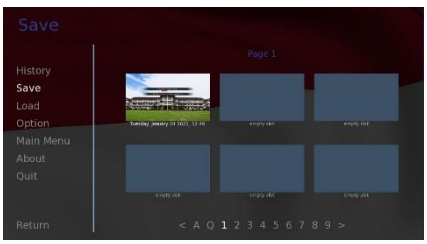
Ren'py is a game engine that uses a textbase program. Existing assets are defined first in the coding text. The assets of the visual novel game are divided into 3 parts, namely character, audio and scene. Character contains the name, text color, and image. The image will be inserted into the image file. In the character definition will be included image settings. The audio in this game only uses 1 piece of music. The scene is basically the back image when the game is running. The image scale will be adjusted according to the size of the game screen.

Visual novels have quite a lot of text, that's why markers are needed to divide the text. On Ren'py displays the text. Visual novels have quite a lot of text, that's why markers are needed to divide the text. On Ren'py displays the text. Visual novels are unique in that the story is determined by the player's choices. Menus are commands for making choices. Each choice will be delimited by a colon symbol. Below the choice will be given the text as an answer and the choice of storyline that results from the player's choice. In this case the Jump command is used to call the label that has been prepared.

The functions that have been mentioned are used to arrange the game according to design. The resulting game application has a size of no more than 100mb. The application is also light for use on both Android smartphones and Android emulators.

The final product is built and formed into an apk file that can be installed on smartphones with the Android operating system. After installing the apk, it will become a game that the user can play offline. The final product results can be observed in the table below.

Table 4. Final product results

	Name	Information
	Icon game	The game icon is an image on the Android desktop after the installation process is complete. The game icon is used to open game applications.
	Interface title	Interface title is the main menu screen display that comes out after the opening. From this screen, users can access the games and features provided by the application through the main menu.
	*Interface ingame*	The ingame interface is the display when the game starts. This screen will display the background image and characters. The box will display the narration and character conversations. Underneath there are navigation buttons that help users in game operations.
	*Interface history*	The history interface is a screen that displays narrative text and character conversations that have been made by the user. This section is the main menu which has functions like the main menu on the title screen.
	*Interface* pilihan	The choice interface is a screen that appears when the user finds options that can be used.
	*Interface* save dan load	The save and load interface is a screen that displays a chart for saving games. There are several storage pages where each page contains 6 boxes to store 1 game.
	*Interface* option	Interface options are screens that display user choices in managing how the game is run. Examples of things that can be set the loudness of the voice and the speed at which the text appears.

The products developed will then be tested. The trial was conducted on an Android smartphone. The trial was carried out by connecting the smartphone device to the laptop used to make game applications. The results of this research will produce an android game product. The physical form will be in the form of an APK file that can be installed on hardware capable of running the Android system. In this case two types of APK are prepared, namely, APK for Android smartphones and APK for Android emulators.

System testing in this study uses black box testing. The game system will be installed on the smartphone according to the specified hardware. The feasibility test was carried out by material experts to find out whether the material content of the visual novel independence game application met the specified criteria. This feasibility test was carried out by Zain Hazmi Zain Baharin and Mariwan Salih Kaka as media experts to find out whether the media design of the visual novel independence game application meets the specified criteria. This feasibility test was conducted to find out whether the visual novel independence game application met the criteria and was feasible to use. The results of the due diligence can be observed in the following table.

Table 5. Due diligence results

Eligibility percentage			Mean
Material expert	Media expert	User	
70%	80%	79,8%	76,6%

In developing this visual novel game Independence through several stages that must be done. The development stage includes initial needs analysis, determining game design, designing assets, making prototypes, evaluating and updating, constructing the application as a whole.

The first stage is the initial needs analysis. Research with interviews and online data collection to be able to determine the functional requirements of a visual novel game. There are many examples of visual novels that can be used as references, but there are still a few references that can be used to make the Android version of visual novels. With the references that have been obtained, the functional requirements of a visual novel game system are determined. This functional requirement then becomes the initial requirement that determines whether the system of the visual novel independence game application is ready for feasibility testing.

The second stage is determining the game design. Design is an important part of the development process of an application because it will facilitate the programming and evaluation process. Making the initial concept of the game application from the literature study conducted. Then determine the flow of the game and the purpose of the game. After that, the main storyline is drawn up which will become the core of the game. From this main storyline, you will be given an intersection or choice which will affect the course of the game. Then make a flowchart as a guide for the flow that will be removed from that choice. The navigation design of this game is a common design used in many visual novels. Changes in the position of the button due to adjustments to the android screen.

The third stage is designing assets. Before making a prototype, the things that must be prepared are the assets of the game application. Indeed, this stage is not written in detail on the evolutionary prototype and is still at the design stage. Separation in the discussion because there are important points that must be understood in the use of assets in the applications that are made. First, the use of illustrations is self-made or edited. This is done in an effort to avoid copyright and create an application that has its own characteristics. Second, the use of music that does not threaten copyright. Music or sound from visual novel games using music that is free to use without worrying about copyright.

The fourth stage is to make a prototype. Prototype is part of an application that already has a functional system that meets initial requirements but is not yet fully built. The first prototype of the visual novel independence game application which contains chapter 1 and chapter 2. This prototype can already run like a visual novel game and will be evaluated at a later stage to determine whether this game application is sufficient to be built as a whole. This prototype stage will be repeated continuously until the evaluation and updating are considered sufficient.

The fifth stage is evaluation and updating. The finished prototype will be tested on a hardware device to see how the application performs. In the initial evaluation, there were many problems in the form of changes in navigational position from when it was built. This is due to the difference in screen resolution during the development of the prototype with Android resolution. Determining the size of the screen resolution is very important to do at the beginning so as not to damage the position of the design arrangement when the application is built. The next evaluation is the rearrangement of buttons that are considered too small on the hardware screen. The next evaluation raises a bug where the back button on the Android operating system cannot be used to exit the game. Design changes by adding a quit button on the mainmenu as well as rearranging the font and button settings. After the evaluation is felt to meet the functional requirements of the system, the repetition of the stage is stopped and goes to the next stage.

The sixth stage is application construction. At this stage is the last part which includes the entire story along with the choices that exist according to the specified flowchart. In this stage, the story text and material are

converted into Python coding. After all the text and material has been converted into coding scripts, a light test is carried out by running the application on an Android emulator. This is done to see if the whole story goes well. After the application can display stories and material properly, the build process is carried out. This build process will generate an apk that is used to install the visual novel independence game application. This apk is also a finished product that can be shared for use. During the build process, the SDK from Andoird is needed, which is plugged into the renpy engine. In this process, the settings are determined in releasing the apk. At this stage the apk is not set to be published on digital game platforms such as Google Play and chooses to release it in a package.

The stages above s has several difficulties that are affected by existing resources. Material resources that can be obtained from textbooks are very helpful in forming storyline designs to making program designs. Asset creation is the most difficult part because there are so few resources that can be used freely. While the construction takes quite a long time due to the large amount of text that must be changed and entered into the coding file.

This visual novel product could have potential in the creative industry. This visual novel product can also be used for student self-learning applications. A simple visual novel will make it easier for students to explore according to their own will. More research and development of narrative techniques is needed so that visual novels can maximize their potential in presenting material.

A game does not always interfere with the learning process. Conversely, game-based learning assignments will enrich the learning environment. Together with the reciprocity between emotion and cognition, we can use games as a special learning tool that can strengthen the learning experience.

This visual novel independence game application goes through several tests to show whether this application is feasible to use. the feasibility test is divided based on the examiner into the material expert test, the media expert test, and the usage test. Prior to the feasibility test with the testers, black box testing was carried out to see whether the functional requirements of the visual novel game application had been met.

Black box testing is testing the application system based on its functionality. In the black box testing results table, it is written the functions that have been determined as the initial requirements of the visual novel game system. In testing the game using smartphone hardware with predetermined specifications. During testing, a valid confirmation will be given to the existing functions table to indicate whether the function is running properly.

The feasibility test on material experts was carried out with a questionnaire as a result to retrieve data. Data analysis on the results of the material expert feasibility test shows that the material delivered by the visual novel independence game application has a feasibility percentage of 70%. Several indicators show a sufficient level of feasibility. The material presented in this game is material that is in the book package so there are still basic competencies that do not yet exist. Games also cannot be said to be good in terms of communication to deliver material and narration. An interesting story structure with a clear narrative is needed in developing further applications. Even though there are deficiencies in several indicators, the material presented has good competency standards. In addition, the data shows that the systematics of delivery and the weight of the material are classified as good. The number of exercises and dialogues to increase motivation is also good. In this case the visual novel game independence has good eligibility according to the specified criteria table.

The due diligence on material experts shows that the contents of this game application are in accordance with the criteria. It can be seen from the data from the due diligence results that this independence game application has strengths in the accuracy and systematics of teaching material with a feasibility percentage of 80%. This independence game application also provides lots of practice questions to improve learning outcomes. This is evidenced by the percentage of material weight and the provision of exercises which are worth 80%.

The feasibility test by media experts will show whether this game media is feasible in terms of presenting the material. Data obtained from media experts shows that the navigation design, text settings, and colors have a feasibility percentage of 80%. Likewise with the touch of music as media accompaniment, it has a feasibility percentage of 80%, with clear sound and easy to adjust the volume. The visible drawback is the image quality which is worth a percentage of 60% in terms of feasibility. Overall the results of the feasibility test by experts have a value of 80%.

The usage test was carried out by taking 20 respondents to use the visual novel independence game application. These responders installed the application on their respective Android smartphones to test the application's performance. After trying the application until it was finished, the respondent filled out the questionnaire as data that had been analyzed on the results of the due diligence.

Usage test shows good results. The average data has a value of 35.95 out of 45 points and after being made the percentage becomes 79.8%. These results indicate that the visual novel independence game application has good feasibility based on 20 respondents who have tried this application. The responders also installed the application on the personal smartphone of each respondent, showing that the visual novel independence game application is compatible with various types of hardware that already meets the specific requirements. fiction.

In recent years Indonesia has experienced a pandemic which has resulted in the closing of schools. This forces teachers and students to carry out online learning activities. Most of these online learning practices utilize existing applications on Android, so that students will be forced to have their own Android. Opportunities for android learning applications have also increased. And it is hoped that the application can contribute to learning carried out by students independently.

The feasibility test on media experts showed that the media design of this independence game application was in a good category. It can be seen from the existing data that the user interface design of the independence game application is well structured. A well-organized user interface will make users comfortable when playing this independence game application. In addition, the color selection of the parts also creates a clear contrast so that the text will be read properly. The weaknesses found are poor image quality.

The summary of the feasibility test results data shows whether the application of the visual novel independence game is feasible. The due diligence on material experts has a percentage value of 70%. The due diligence on media experts has a percentage value of 80%. Test usage on users has a percentage value of 79.8%. An average of the three values is made to draw conclusions to produce a percentage value of 76.6%. With the results of this percentage, it can be concluded that the visual novel game application for independence has good eligibility according to the specified table.

In the independence game application usage test, it shows that the application is in the good category. In the data from the test results it can be seen that the application can run smoothly without visible bugs and errors. Using the application is also easy for beginners to understand. the user interface image design, music, and background are nice and very clear. The only drawback is the character design which is not refined yet. With this it can be concluded that this independence game application is feasible and good to use. The implication of this research is that teachers from this research can be used as interactive learning media to teach material about the history of Indonesian independence. Then for students provide games that can be played for learning.

4. CONCLUSION

The conclusion that can be drawn from this research is that using Renpy as an engine makes it easier to make the Visual Novel Independence Game application process easier. Renpy which is a textbase makes errors and troubleshooting easier to overcome. Furthermore, the independence game application is good and can be said to be appropriate as a learning medium. From the feasibility test summary, the feasibility percentage of the Visual Novel Merdeka game has an average of 76.6%. This percentage is categorized as having good eligibility. In terms of the material for the independence game application, it is also in accordance with the needs of teaching materials for grade 11 high school or vocational school. This application is light, easy to understand and has a small size so that it will make it easier to use. Even though there are deficiencies in the design of the character images, it does not reduce the learning impact obtained. It can be concluded that this independence game application has a good feasibility level.

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